



Executive summary

Each year government invests billions of dollars in infrastructure to meet the social, economic and environmental needs of WA. It makes sense to consider these investments as part of a long-term plan – one that takes into account long-term challenges and identifies emerging opportunities. Addressing those challenges and opportunities requires a shift in the way the state plans, delivers, operates and maintains infrastructure. The State Infrastructure Strategy (Strategy) sets the state on that path.

The Strategy represents Infrastructure WA's (IWA) assessment of the state's significant infrastructure needs and priorities and makes recommendations to address them. This document provides the framework for improving the state's public infrastructure system. It addresses key areas and requirements that frame and guide infrastructure processes, such as strategic planning, legislation and regulation, policy and decision-making tools. These improvements will help futureproof the state and provide greater investment certainty for industry and the thousands of people who work in WA's infrastructure sector.

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This first Strategy provides the **framework for improving the state's public infrastructure system.**

There are good examples of effective work being done across the public sector. However, further steps must be taken to improve infrastructure coordination and development processes. This will provide the WA Government with a whole of government perspective and improved information from which to identify priority infrastructure investments. These investments can offer WA more value over the long term and support the state in meeting agreed government objectives, such as economic diversification.

IWA's work in this first Strategy has been impacted by the limited availability of WA Government agency, statutory authority (collectively referred to as state agencies) and government trading enterprise (GTE) infrastructure plans that extend beyond the annual State Budget's 4-year forward estimates. Where longer-term plans exist, they were typically developed with a narrower focus on the business of the state agency or GTE, rather than taking a more coordinated view across government. Coordinated and collaborated plans that recognise impacts and opportunities across state agencies and GTEs were generally not available.

While this may be understandable, given that such coordination in the infrastructure development process was not always the focus, it does mean that the first Strategy focuses largely on getting the basics right. This will help to ensure future infrastructure investment decisions

are based on quality data and, in the meantime, that the right decisions are made to increase the value received from existing infrastructure assets over the long term. It is important to focus on improving the investment decision-making system so that long-term planning is consistent, aligned and evidence-based.

Simply building our way out of an increasing demand for infrastructure is unaffordable and cannot be the only solution. Infrastructure that is built should be built to last. In addition, what is built today will typically still be operating in several decades, serving a society, economy and environment that may be vastly different from those we see and experience now. Maintaining long-term currency of infrastructure assets is a major challenge, particularly given the pace of technological change and rate of digitisation. Globally, the move is towards a much more modular and agile approach to the build and use of infrastructure. For WA, that means recognising that while the physical infrastructure might still be operating in several decades, its use may well be significantly different. We will need to make swift transitions, enabled increasingly by digital technologies. Our built infrastructure will need to be smarter, more integrated, connected and resilient so that value to the community and industry is maximised.

This Strategy also recommends more than 70 capital projects and programs for investment, business case development, planning or



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investigation, but it is not just a long list of projects. Rather, a significant number of the recommendations relate to non-build initiatives, concentrated over the next 10 years. This will provide the framework and foundation for IWA to build upon with future state infrastructure strategies.

The final Strategy recommendations form the basis of IWA's advice to the WA Government and inform other functions, such as IWA's role in assessing major infrastructure proposals and the preparation of an annual 10-year state infrastructure program by the WA Government.

Current state

A unique combination of global and local circumstances, dominated by the ongoing impacts and risks of the COVID-19 pandemic, mean the Strategy is being finalised at a time when the public sector is subject to an unusual level of uncertainty and pressure. Attention over the past 2 years was necessarily focused on immediate management and planning priorities rather than longer-term planning.

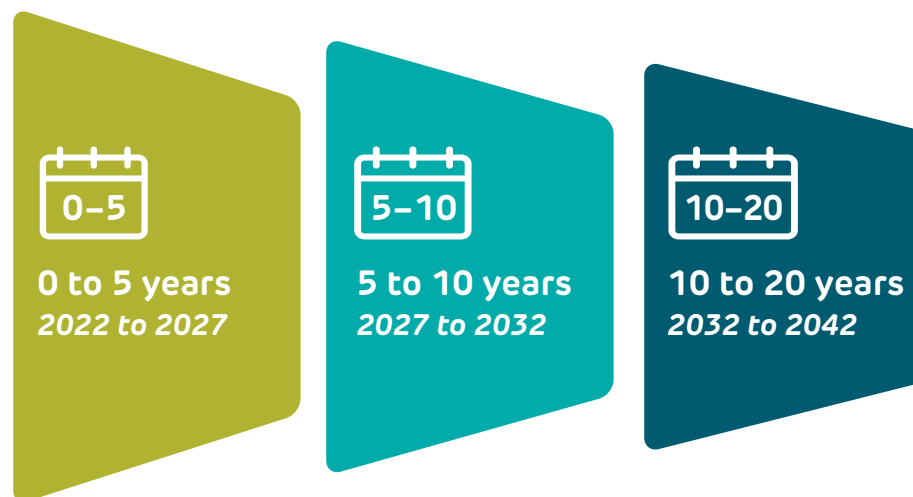
While IWA has recognised and carefully considered those factors in framing its recommendations, the Strategy also underlines the importance of evidence-based, long-term planning to maximise value, improve resilience and best serve the WA community.

Economically, the state has performed well during the pandemic. A combination of factors has provided a significant contribution to supporting this economic performance. These include relative certainty in business conditions, government management of the pandemic, federal and state government stimulus measures and the strength of the state's resources sector. Further detail on the infrastructure-related impacts of the COVID-19 pandemic is provided in the Introduction.

Infrastructure investment has been a primary economic-stimulus policy tool at the state and federal levels. Considerable effort has been directed by many state agencies and GTEs to develop stimulus measures. State agencies and GTEs are currently tasked with delivering an expanded Asset Investment Program. The original target time frames for completing many projects were fast-tracked during 2020 in anticipation of a prolonged and severe economic downturn. The infrastructure-related capability and capacity of the public sector is now heavily focused on delivering the large volume of current projects and programs.

Implementation of the Strategy's recommendations, therefore, extends over 3 time frames: 0–5 years, 5–10 years and 10–20 years (Figure 1). The Strategy provides a framework to enable the public sector to develop its infrastructure plans and programs in a more coordinated and comprehensive manner. IWA's analysis found that the quality, breadth

Figure 1: State Infrastructure Strategy time frames



and depth of the current asset plans of state agencies and GTEs varied considerably. The Strategy's 0–5 year recommendations are essential to establishing these long-term plans to an appropriate standard across all state agencies and GTEs. Strategy recommendations that have a 0–5 year focus include non-build actions, work that government has already initiated, ongoing planning activities and recommendations that require rapid progression due to state needs.

Through the consultation process on the *Foundations for a stronger tomorrow, State Infrastructure Strategy draft for public comment* (draft strategy), IWA received feedback from stakeholders requesting greater guidance on specific completion dates for recommendations within the 0–5 year time frame. As a result, IWA undertook a detailed review of all recommendations, in consultation with suggested lead state agencies and GTEs, to identify specific years for completion. Particular attention was given to ensuring the overall timing of recommendations as a package is affordable and achievable, with consideration given to state agency and GTE workloads.

IWA will assist the WA Government throughout implementation of those recommendations supported by the WA Government.

Public infrastructure represents approximately 20% of total public and private infrastructure investment across the state.¹ It provides the facilities for essential social, economic and environmental services provided to the community and industry. The delivery of public infrastructure is heavily influenced by conditions in the broader economy. Governments participate as clients in the construction market. To secure private sector contractor capacity, government projects must compete against the much larger number and higher value of private sector projects. Greater certainty of the WA Government's long-term infrastructure direction and pipeline of work is required to instil confidence in the infrastructure industry and the thousands of people who work in it. This will be assisted by:

- the WA Government's articulation of how it will implement and prioritise the Strategy's supported recommendations, including releasing an annual state infrastructure program with a 10-year outlook from 2023
- monitoring and annual public reporting, prepared by IWA, on the WA Government's progress in implementing the Strategy's supported recommendations.

Challenges and opportunities

The infrastructure challenges and opportunities facing WA are many and varied and are referenced throughout this Strategy. A number of key challenges and opportunities, however, have underpinned the development of many of IWA's recommendations.

WA's economy is strong, yet heavily reliant on selling raw materials to the world. While WA's natural resources are expected to drive the state's growth for many years to come, it is well recognised that a shift to a more diversified and complex economy is needed to ensure a strong and resilient state into the future – one that can withstand risks such as changing trade relationships. Infrastructure is crucial to supporting and growing existing industries and serves as a catalyst to unlock emerging industries.

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The WA population is forecast to grow from around 2.7 million in 2021 to 4.3 million by 2042, an increase of 60%.² This is based on a return to open borders and net migration in the near term. In this environment, Perth and many other centres around the state will continue to grow, placing increased pressure on existing infrastructure and generating demand for new infrastructure. Factors such as reduced rainfall and the introduction of new technologies will mean that the population, and population growth, in some centres is likely to stabilise or even decline. This will present different challenges and a need to adopt new models to provide infrastructure and services in alternative and more efficient ways.

Demographic trends to 2042 indicate relatively low birth rates and a higher percentage of the population aged 65 years or over.³ This will impact many infrastructure sectors, particularly health and education, and will have flow-on economic impacts.

The demand for infrastructure and services is ever increasing, placing pressure on the sustainability of government finances. This Strategy highlights the need for a stronger focus to be placed on demand management and prevention initiatives that ultimately divert, delay or avoid the need for costly infrastructure. Infrastructure and services should also be delivered more efficiently where possible.

On current predictions, climate change will impact areas of the state in different ways, with significant impacts such as reduced rainfall, more intense weather events, a rise in sea level, coastal erosion and shifts in temperature.⁴ The need for our current and future assets, the people who use them, and the economy to have the capacity and resilience to deal with the infrastructure-related challenges of climate change must not be underestimated. Climate change is also driving the need to reduce emissions. Given the nature of industry in WA, reducing carbon emissions to reach net zero by 2050, in keeping with the WA Government's stated target, while remaining globally competitive, is both a challenge and an opportunity. Infrastructure has a large role to play in reducing emissions across sectors such as energy, transport, water, waste and the built environment.

Embracing digital technologies will result in increasing agility in the provision of government services. This can be achieved by enabling data-informed and quick-response decision-making, and flexible service delivery models. As evidenced in other jurisdictions, digital transformation can be harnessed in WA to create competitive advantage, efficiencies and jobs. A digital-first approach should be embedded throughout the infrastructure lifecycle to maximise the value of infrastructure. As technologies do also give rise to greater risks of digital disruption, such as increased cybercrime, a strong risk-based management approach is warranted.

Approach to developing the Strategy

Given the dynamic rate of change and the inability to precisely predict the future over a 20-year horizon, IWA's approach to developing the Strategy has been to place a strong focus on exploring what the future might present and applying scenario planning to identify a range of plausible futures. IWA examined global megatrends and drivers in the context of WA's strengths and advantages and identified 6 strategic opportunities where these intersect. These opportunities formed the foundation of the Strategy's 2042 vision – driving the state towards a more diversified economy and prosperous society over the long term.

The 6 strategic opportunities identified for WA are:

-  a global location of choice
-  value-adding for strategic commodities
-  approaching the technology frontier
-  transitioning to net zero emissions technologies
-  promoting and leveraging Aboriginal cultural heritage and enterprise
-  serving the emerging consumer class

IWA identified strategic opportunities which formed **the foundation of the Strategy's 2042 vision** – driving the state towards a more diversified economy and prosperous society over the long term.

Working with these 6 strategic opportunities provided IWA with a top-down approach to developing the Strategy. IWA also used a bottom-up approach – reviewing the range of existing infrastructure strategies and plans held by state agencies and GTEs. As a result of this hybrid approach, a number of IWA's recommendations focus on accelerating and building upon work that government has already initiated.

As part of the development process, IWA consulted widely to gather different perspectives on a wide range of infrastructure issues and potential solutions. To ensure the Strategy was evidence-based, IWA also commissioned work where gaps existed, and to better understand technical and strategic matters.

In line with the *Infrastructure Western Australia Act 2019* (IWA Act), IWA has taken a triple bottom line approach – considering social, economic and environmental matters – in developing the recommendations.

Feedback received during consultation on the draft strategy has further refined the Strategy's content and recommendations. Hundreds of stakeholders provided feedback on the draft strategy, providing a wide range of perspectives. The consultation outcomes chapter, A collaborative journey, provides an overview of what IWA heard and outlines the refinements made throughout the Strategy to address this feedback. In addition, each cross-cutting theme and sector chapter contains a summary of stakeholder feedback and subsequent refinements specific to that chapter.

Core themes

The Strategy is divided into chapters that address 7 cross-cutting themes and 9 infrastructure sectors. As wide as those areas may be, there are core themes that underpin most of IWA's recommendations. These core themes were recognised and reconfirmed by IWA's consultation on the draft strategy.

Managing demand for infrastructure through prevention, early intervention and pricing

Infrastructure is costly to develop, operate and maintain and it is becoming increasingly challenging for government to meet the growing demand for infrastructure and services. IWA has found that a greater focus on demand management and prevention initiatives – whether it be from a transport, health or cross-sectoral perspective – can ultimately divert, delay or avoid the need to build and maintain costly infrastructure. Early intervention to address complex issues, such as social disadvantage, can also help to improve an individual's life

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outcomes and reduce demand on health and other social services infrastructure. These gains take time to realise, and government may need to spend more initially to realise the benefits. For example, access to social and affordable housing is a key factor in reducing disadvantage and enabling a safe and secure base from which to access wraparound services.

While there are examples of the successful rollout of demand management and prevention initiatives in WA, there is scope to apply these practices across a wider range of sectors and at an increased scale and pace. These initiatives are often complex, particularly in relation to social infrastructure and services, and therefore require coordinated action across multiple entities within and outside of government.

IWA has made a range of recommendations that recognise the importance of demand management and prevention measures, such as transitioning to a person-centric, preventative and community-based public health system to reduce demand on hospitals. The Water, Waste, Transport, and Justice and public safety chapters also include demand management recommendations.

The Strategy also recognises that demand management initiatives will increasingly rely on digital technologies, which can improve understanding of consumer behaviour, better monitor infrastructure performance and provide valuable data to inform planning and decision-making. Demand management is discussed in greater detail on page 172.

Improving the quality and consistency of strategic infrastructure planning and processes

One of IWA's primary findings is that individual state agency and GTE infrastructure strategies, plans and business cases are, in many cases, of inadequate quality and consistency. In the main, these documents are outdated, generally focused on a 5-year period and do not adequately or consistently consider strategic matters such as climate change mitigation or adaptation, or the opportunities that digital technologies can provide.

Other common themes that emerged, and that underpin many of IWA's recommendations, were the need for infrastructure planning to be place-based and community-led to ensure infrastructure is fit for purpose and meets the needs of the community it serves. Achieving greater integration of land-use and infrastructure planning is also addressed in the recommendations. Integrating state agency and GTE long-term plans for infrastructure and services with desired patterns of growth and development enables the right infrastructure to be delivered in the right place and at the right time. For example, the integration of transport and land-use planning is paramount to achieving urban consolidation objectives and can reduce overall travel demand and distances, shift mode choices and deliver system efficiencies. Aligning housing, health, education, arts and recreation investments with transport and land-use plans will enable us to live more sustainably and affordably.

The Strategy also places a strong focus on improving system basics, identifying gaps in the strategic planning framework and recommending improved processes to guide state agency and GTE planning. Improving these plans and processes will provide a strong foundation on which future state infrastructure strategies can build. Good-quality, consistent and integrated planning, and well-informed decision-making by government will also support greater investment certainty for industry.

The review and improvement of the Department of Treasury's Strategic Asset Management Framework is strongly recommended to guide state agency and GTE planning. IWA appreciates, however, the resource implications for state agencies and GTEs of the measures proposed in this recommendation and therefore proposes they mostly apply to projects and programs of \$100 million or more, in the first instance.

At a cross-cutting theme and sector level, the Strategy recommends development of a number of strategies and plans to establish the long-term needs for the different sectors, which can then inform future government activities. This includes plans relating to digital connectivity, water, housing, waste, transport, land use, arts and culture, sport and tourism. This Strategy recommends that a range of plans be finalised or refreshed in the health sector and recommends the development of a strategic framework to maximise regional development outcomes.

Addressing climate change

Climate change was a high-priority issue raised by stakeholders throughout the consultation undertaken as part of developing the Strategy. It is a critical long-term issue impacting many sectors, particularly water, transport and energy, and one that is not currently adequately addressed by most state agency and GTE infrastructure planning systems and processes.

Reducing carbon emissions and improving the resilience of infrastructure to address the impacts of climate change is also a focus of this first Strategy. In developing the Strategy's climate change recommendations, IWA has considered the Western Australian Climate Policy (WA Climate Policy, inclusive of the *Western Australian Climate Policy: a plan to position Western Australia for a prosperous and resilient low-carbon future*). Building on this policy, several recommendations seek to embed and accelerate the implementation of key elements as they relate to infrastructure. This includes a more coordinated and accountable WA Government, state agency and GTE leadership, and transparent reporting on progress.

Climate change recommendations seek to embed an interim target and net zero emissions by 2050 target for WA, focusing on the assets and activities of state agencies and GTEs as a priority. The Strategy's recommendations leverage the net zero emissions transition plans and sectoral emissions reduction strategies detailed in the WA Climate Policy, emphasising the need to accelerate development, with actions funded and resourced.

The Strategy places a strong focus on **improving system basics, identifying gaps in the strategic planning framework and recommending improved processes** to guide state agency and GTE planning.





Implementing data sharing and other tools to support infrastructure planning and investment decision-making

Sound infrastructure planning, policy and investment decision-making is underpinned by access to current, high-quality and fit for purpose data. The application of consistent planning assumptions, availability of data and forecasts at suitable geographies, and access to data analytics, visualisation capabilities and modelling tools are important in developing evidence-based, aligned and integrated infrastructure plans and major infrastructure proposals.

In developing the Strategy, IWA found that while some state agencies and GTEs have access to complex data and models to support planning processes, others were lacking, and many did not apply scenario planning as a tool. While many state agencies and GTEs hold large amounts of data, little of the most valuable data is shared.

To improve on these issues, this Strategy recommends further a government data management and asset information policy that includes processes and standards to enable data sharing and analysis. Specifically, this should be done to address 2 pressing challenges: management of the existing asset portfolio, and planning and prioritising new infrastructure. The Strategy also recommends establishing a whole of government digital platform that enables sharing of location-based asset information. Other recommendations include developing and implementing a single set of common planning assumptions to improve the alignment and consistency of strategic planning processes and developing climate change data projections across all regions of the state to inform strategic planning.

Optimising the existing infrastructure asset base

As the network and scale of the state's infrastructure assets grow, so does the cost to operate and maintain the asset base. Around two-thirds of the total cost of an asset generally occurs after it is built or acquired.⁵ The state's vast distances and low population densities in most areas present further challenges in optimising investment decisions.

Establishing and providing funding to support sound asset management practices is a challenge for all governments, at both state and local levels. IWA's baseline review confirmed that while asset management practices vary considerably across government, these practices require substantial improvement across most state agencies and GTEs. Common features include significant maintenance backlogs, a lack of asset management data and a short-term focus on funding new projects. Challenges in meeting the growing demand for infrastructure and services within fiscal constraints is driving the need to consider how existing infrastructure can be used more efficiently and effectively.

The Strategy recommends infrastructure planning processes consider how existing assets can be optimised or capacity increased before new builds are considered. The application of digital technologies or non-capital demand management solutions provide many opportunities to extend asset life or increase capacity, deferring or avoiding the need to build new infrastructure. A digital-first approach should be embedded in asset planning and management processes to identify where digital solutions can achieve asset optimisation. Improving the integration of land-use and infrastructure planning can also help to improve the use of existing assets, for example, by considering where system capacity is available to support increased urban densities.

The Strategy includes a number of recommendations to improve maturity in asset management practice by state agencies and GTEs, incentives to implement improvements, and improvements in asset information policies, processes and standards.

Identifying major infrastructure projects and programs

While the Strategy places a strong focus on non-build system improvements, it also recommends more than 70 capital projects and programs for investment, business case development, planning or investigation. Further, the Strategy recommends measures to improve project assurance, governance and skill development, while modernising procurement and cost management.



Challenges in meeting the growing demand for infrastructure and services within fiscal constraints is driving the need to consider **how existing infrastructure can be used more efficiently and effectively.**

The Strategy recommends investing in major projects and programs across the Water, Transport, Housing, Arts, culture, sport and recreation, and Justice and public safety chapters. IWA also recommends that essential infrastructure in remote Aboriginal communities and town-based reserves be upgraded.

Strategy recommendations

IWA has made 93 recommendations addressing key infrastructure sectors and a range of cross-cutting themes. Many of the recommendations are related and interconnected. IWA has carefully considered how the recommendations work together to achieve the Strategy's vision and objectives.

Many of the recommendations are non-build initiatives, focusing on improving fundamental elements of the infrastructure system, such as policy, planning and legislative frameworks. Significant thought has gone into ensuring they are affordable and deliverable and that they are evidence-based wherever possible and will have lasting impacts over the long term. Many of the recommendations address major investment across both economic and social infrastructure sectors, having also considered environmental matters.

Strategy vision and infrastructure outlook

Fast forward to the year 2042

To navigate our way to a stronger tomorrow, we need to imagine what our future looks like and establish a vision for the state in 2042. This will create a framework for understanding what needs to be done, now and over the medium to long term, to get there. This section outlines this vision by referring to the main global megatrends and drivers of change that IWA expects will impact the state. Clearly, many things will occur over the next 20 years that no-one can accurately predict. The vision, therefore, also provides a framework within which these unanticipated developments might be managed.





Vision statement

WA is a sought-after place to **live, visit, study and invest**, with infrastructure improving productivity and equity, and unlocking industry growth that **leverages WA's advantages** and diversifies its economic base.

Western Australia in 2042

In 2042, WA has come a long way. Even though the population has grown to 4.3 million, carbon emissions have reduced markedly as a result of the transition to green energy, increased energy efficiency and a strong uptake in the low and zero emission vehicles market. Accessible social and affordable housing has made great strides in reducing homelessness, unemployment is low with a skilled labour force filling jobs in the green and digital economies and, while the state's economy is still supported by a strong resource and energy sector, growth in other sectors has resulted in a more diversified economy bolstered by efficient supply chains.

Aboriginal culture is thriving

Enduring connections between land and wellbeing are recognised and Aboriginal culture has been elevated as a source of higher knowledge. As a result, WA's society, economy and environment have grown as Aboriginal people's deep knowledge of the land is shared and integrated with research and development. WA's Aboriginal population has prospered, with considerable advancements in Aboriginal business development, economic participation and social outcomes. Aboriginal culture has flourished as part of a vibrant WA cultural identity, recognised locally and internationally for its arts and cultural tourism offerings. The state's infrastructure investment in housing, water, energy and digital connectivity in Aboriginal communities has helped close the gap on Aboriginal disadvantage.

The green energy economy is booming

Driven by a strong commitment by governments, industry and the community to reduce carbon emissions, WA has successfully navigated its way through a reduction in fossil fuel consumption by investing in a renewables market. WA has been particularly successful in solar and wind energy generation, taking great advantage of the state's vast available land and its significant solar radiance and wind speeds. Coupled with the development of a successful green hydrogen energy industry, WA's industries and households benefit from reduced energy costs, with a significantly decarbonised local industry and a new major export.

The ongoing decarbonisation of the global economy has created a fast-growing demand for WA's rich minerals, which are needed to enable the world's energy transition. With its strong industrial history in the resources sector and its substantial reserves of cobalt, nickel and lithium, it has been a natural transition for WA to develop a strong export market in these strategic commodities. The state's early recognition of downstream processing opportunities, enabled by an affordable supply of green energy, has optimised the value of our mineral resources and we are now enjoying a richer and more diverse export market than ever before. WA's well-developed lithium battery manufacturing industry is directly servicing the massive global green construction and electric vehicle market.



A diverse and thriving economy

Downstream processing opportunities have not been limited to minerals. New technology enabling increased water efficiency has been coupled with investment in agrifood and has raised productivity to facilitate the transition from low-input/low-value production to low-input/high-value production business models. Foresight in the 2020s that recognised the opportunity from the growing middle-class consumer market (particularly in Asia) has led to the expansion of markets in the tourism, education, agriculture and food, and cultural sectors.

A proactive commitment to expand and diversify WA's economic base has resulted in the growth of advanced manufacturing hubs where industries such as shipbuilding, digital technologies and advanced materials are thriving. WA has combined its strengths in shipbuilding and subsea expertise to become a world-class centre for maritime and naval shipbuilding and maintenance.

WA's reputation as an important incubator of knowledge capital and innovation has led to continued investment in research and development. This investment has grown from a strong focus on oil and gas, minerals, exploration and mining services to a much broader scope. WA is now also leading in equipment manufacturing, information technology system design, remote operations and automation across several sectors. Strong collaboration between universities, research institutions and industry has underpinned extensive innovation across a range of WA's key industries.

Western Australia is the place to be

WA is renowned as a global location of choice for international migrants to live, visit, study and invest. WA recovered well from the impacts of the COVID-19 pandemic in the early 2020s, and our progressive and person-centric health system is recognised as world-class. Our ongoing strong performance in global liveability rankings has encouraged skilled migrant workers to our shores and the international education sector is flourishing.

Regional communities have benefited from our strong growth in the knowledge economy, diversifying beyond traditional agricultural and resource industries. WA's access to high-quality digital connectivity and optimisation of fast-speed international connections has resulted in the state being highly competitive in the global marketplace.

Outlook for Western Australia

Table 1 presents information representing significant shifts sought over the next 20 years for each of the cross-cutting themes and sectors addressed in this Strategy.

Table 1: Western Australia – today and tomorrow

	Today – 2022	Tomorrow – 2042
Cross-cutting themes		
 <p>Digital connectivity and technology</p>	<ul style="list-style-type: none"> • Mobile coverage in regional and remote WA is highly variable and patchy, with 1,750 registered mobile blackspots.¹ • A mix of new and legacy technologies is resulting in variable performance, with some areas of WA experiencing slow, unreliable and costly internet services. • Adoption of digital technologies in infrastructure planning and control systems is emerging but is hampered by outdated information and communications technology systems. 	<ul style="list-style-type: none"> • Due to its digital transformation, WA is a leader in the knowledge economy and is reaping the benefits of digitised infrastructure systems and advanced manufacturing hubs. The Square Kilometre Array and space research have become established components of the science and research sector supported by world-leading, high-performance computing capability. • High bandwidth and data demand, driven by increased uptake of digital, is being met by the availability of a range of telecommunications services at affordable prices. • Government infrastructure assets are digitised, and a strong data analytics and visualisation capability informs planning and decision-making and results in significant cost savings.
 <p>Aboriginal cultural heritage, wellbeing and enterprise</p>	<ul style="list-style-type: none"> • Aboriginal cultural heritage is a rich and enduring resource, and its benefits and opportunities are starting to gain wide acknowledgement. • Like other Australian jurisdictions, WA has made limited progress in meeting Closing the Gap targets.² • Sub-standard infrastructure and services in many remote Aboriginal communities and town-based reserves is resulting in poor environmental health outcomes. 	<ul style="list-style-type: none"> • Aboriginal cultural heritage is widely celebrated, supported and acknowledged, with Aboriginal business development, economic participation and social outcomes strongly established. • WA is meeting Closing the Gap targets. • Remote Aboriginal communities and town-based reserves receive appropriate essential services.
 <p>Climate change and sustainability</p>	<ul style="list-style-type: none"> • International and domestic pressure on governments to take strong action to mitigate climate change is intensifying. In its WA Climate Policy, the WA Government seeks to achieve enhanced climate resilience and net zero emissions by 2050.³ • WA is highly vulnerable to climate change. Average temperatures have already risen about 1°C over the past 100 years.⁴ The impacts of climate change are particularly evident in coastal erosion, water availability and natural disasters. • Infrastructure sustainability innovation is being implemented in some sectors, including the use of sustainability rating tools in some cases. 	<ul style="list-style-type: none"> • Aligned with growing global recognition of climate change, the state has progressed substantially towards its net zero emissions by 2050 target and has met or exceeded its interim targets by progressive transition to green energy and fuels, greater energy efficiency and offsetting residual emissions through carbon sequestration. • The public infrastructure program has undertaken a comprehensive transition to renewable energy use and the adoption of sustainable infrastructure design. • There is an ongoing focus across state agencies and GTEs to provide resilient infrastructure and services to adapt to and mitigate climate change impacts.

Table 1: Western Australia – today and tomorrow (continued)




	Today – 2022	Tomorrow – 2042
 <p>Regional development</p>	<ul style="list-style-type: none"> • WA has transitioned from the 2007 to 2013 resources investment boom and regions are entering a new phase of economic diversification and growth. • Regional challenges such as digital connectivity, housing and climate change are impacting on regional development. • Unclear regional development priorities are holding back step change in regional outcomes. 	<ul style="list-style-type: none"> • Regional economies are diversifying and growing, capitalising on relative strengths to attract people and investment, drive skills and innovation and create sustainable business and employment. • WA's network of liveable, connected and growing regional centres is offering high-quality services, attractive lifestyles, employment and careers. • Collaboration between communities, government and business is driving diversification and growth and achieving a step change in regional outcomes.
 <p>Planning and coordination</p>	<ul style="list-style-type: none"> • The extent of integrated land-use and infrastructure planning across the state is highly variable in currency, long-term outlook and evidence-based understanding of infrastructure needs to support growth. • Some progress is being made towards the 47% infill target for Perth and Peel but more work is needed to unlock barriers, increase amenity and incentivise development in established urban areas, which will lead to better use of existing infrastructure.⁵ 	<ul style="list-style-type: none"> • A shared, long-term view of WA's public infrastructure needs is driving well-considered investment decisions and collaborative delivery. • Integrated regional plans are established, measured and routinely updated, aligning infrastructure needs with population change and economic development. • Improved attractiveness and feasibility of urban intensification has resulted in well-located and well-designed infill development being the preferred outcome, with infill targets being met or exceeded.
 <p>Infrastructure delivery</p>	<ul style="list-style-type: none"> • Industry can struggle to respond to peaks and troughs in infrastructure investment without long-term pipeline visibility or the certainty to increase investment in training. • Skills across the infrastructure lifecycle vary within the public sector, and the lack of skilled personnel is a challenge due to the cyclical infrastructure market. • Project approvals, procurement and assurance practices are impacting on infrastructure delivery objectives and heightening risk profiles. 	<ul style="list-style-type: none"> • The certainty provided by an infrastructure pipeline has resulted in a well-resourced, appropriately skilled and sustainable infrastructure sector. • Modernised project procurement and assurance processes enhance the efficient and cost-effective delivery of the state's infrastructure program. • The public and private sectors have the confidence and appetite to invest in productivity-enhancing economic infrastructure, enabled by policies and practices that protect the public interest.

Table 1: Western Australia – today and tomorrow (continued)




	Today – 2022	Tomorrow – 2042
 <p>Asset management</p>	<ul style="list-style-type: none"> The level of maturity in asset management practice varies considerably across the WA public sector, including local government, resulting in a significant maintenance backlog. There is an absence of incentives to drive better practice in asset management or extend the life of existing assets instead of building new ones. Asset information is inconsistent and often inaccurate, making it difficult to understand risks or secure funding for asset maintenance and renewal. 	<ul style="list-style-type: none"> The state’s asset base is well understood, managed and maintained, resulting in appropriate levels of funding, better service provision, safer assets and lower lifecycle costs. All state agencies and GTEs have access to centralised, best-practice guidance and support, have a baseline level of asset maturity, and individual asset management systems are operationalised. Use of digital technologies and real-time data in asset management is common practice.
Sectors		
 <p>Energy</p>	<ul style="list-style-type: none"> Transition to renewables is underway with rooftop solar systems common in WA, adding complexity to baseload supply systems. Emergence of standalone power systems in regional and remote areas is increasing. Battery technology is improving but is not yet a viable solution to baseload supply. WA dominates the country’s liquefied natural gas (LNG) output and Australia has become one of the largest exporters of LNG. 	<ul style="list-style-type: none"> Gas remains a component of the state’s base energy system but is offset through successful carbon sequestration. WA has primarily transitioned from coal-fired to renewable energy generation and is a leading exporter of renewable hydrogen as international trading partners demand cleaner fuels and energy. WA is on track to meet its net zero emissions by 2050 target. Households and businesses are increasingly adopting off-grid renewable energy generation and storage options while using energy-efficient appliances in energy-efficient buildings. The resource extraction industry transitions from diesel to renewable energy generation and storage, including renewable hydrogen, enabling value-adding through downstream processing.
 <p>Water</p>	<ul style="list-style-type: none"> Large centralised systems provide water treated to drinking water standards for all-purpose use. Water supply mix is dominated by desalination and groundwater, with wastewater recycling and replenishment schemes also contributing to a small degree. Water demand management policies are having some success in reducing water consumption, with further measures and increased targets needed. 	<ul style="list-style-type: none"> Water security and resilience is achieved through best-practice natural resource management and investment in climate-independent and energy-efficient water sources. A highly water-literate consumer base and an optimised infrastructure network has combined to achieve water efficiency targets. Implementation of full water-cycle management, including reuse and waste minimisation, has resulted in optimised use of multiple water sources.

Table 1: Western Australia – today and tomorrow (continued)




	Today – 2022	Tomorrow – 2042
 Waste	<ul style="list-style-type: none"> • WA's economy is based on a take, make, use and dispose economic model. However, Western Australians are increasingly recycling and avoiding waste. • WA is not achieving waste targets, and bans on the export of waste plastic, paper, glass and tyres are placing pressure on waste management. • Community attitudes towards waste are shifting. However, these remain a major barrier to increased waste avoidance and recovery. 	<ul style="list-style-type: none"> • WA has embraced a sustainable, low-waste circular economy that values waste, produces less waste, and reuses and recycles more for the benefit of the WA economy and environment. WA's waste targets are being met or exceeded. • Strong demand for recycled waste products is contributing to meeting waste targets for waste avoidance and recovery. • Modern, accessible and well-managed waste infrastructure is supporting a viable domestic recycling industry.
 Transport	<ul style="list-style-type: none"> • Private motor vehicles remain the dominant mode of transport over public transport, cycling and walking. • There is early-stage movement towards an integrated and mode-agnostic approach within the Transport Portfolio. • Multi-modal freight supply chains support primary industry exports. 	<ul style="list-style-type: none"> • Technological advances in transport, through automated and semi-automated vehicles and zero emissions technology, lead to more productive supply chains, improved safety outcomes, cost savings and lower emissions. • Fully integrated planning and delivery results in more efficient and flexible connections between transport modes and stimulates and supports greater infill housing development, with a modal shift towards greater public transport use and active transport. • Ongoing targeted investment in freight networks, including in the Perth metropolitan area, supports efficient supply chains, international trade and export industries. • Improved technology, infrastructure planning and behavioural change lead to better transport system safety outcomes in line with the WA Government's vision for zero serious injuries and deaths on WA roads.
 Housing	<ul style="list-style-type: none"> • There is increasing demand for social housing linked to rapid changes to personal circumstance and the housing market as a result of the COVID-19 pandemic. • Social and affordable housing planning and investment does not fully respond to region-specific market conditions. • A disproportionate number of Aboriginal people live in overcrowded dwellings and experience issues accessing housing. 	<ul style="list-style-type: none"> • Tailored home and housing support, at the right time and in the right place, is more accessible. • A diverse social and affordable housing sector provides greater choice and targeted wraparound services catering for the needs of vulnerable people. • Targets to reduce overcrowding in Aboriginal communities have been met and Aboriginal organisations lead the delivery of social and affordable housing in their communities.

Table 1: Western Australia – today and tomorrow (continued)





	Today – 2022	Tomorrow – 2042
 <p>Health</p>	<ul style="list-style-type: none"> • WA’s population is growing and ageing, and the incidence of chronic disease is placing increased pressure on the health system. Mental health is an area of significant need. • WA’s health system is focused on treatment in acute hospitals and growing expenditure may negatively impact on other areas of the State Budget. • Managing the impacts of the COVID-19 pandemic is a current system-wide focus. 	<ul style="list-style-type: none"> • WA’s population is healthier, supported by a health system with a strong focus on prevention, equity, child health, end-of-life care, and more seamless access to services at home and in the community through use of technology and innovation. • Advanced technologies and a digital approach underpin a modern, integrated and personalised health system delivering safer, more efficient and higher-quality health care. • WA is globally recognised for innovative biotechnology and digital health, personalised medicine and advanced manufacturing of medical products, and the medical research sector has grown as a share of the WA economy.
 <p>Education and training</p>	<ul style="list-style-type: none"> • There is a greater focus on group and collaborative learning with fit for purpose classroom design incorporated into new schools. Online and distance learning is in use in some cases. • TAFEs, private training organisations and WA industries are increasingly collaborating to understand curriculum and training needs. • Changes to funding and reduced migration as a result of COVID-19 are impacting on the financial viability of the state’s universities. 	<ul style="list-style-type: none"> • Education and training facilities are delivered using modern methods including modular offsite construction techniques that are designed for modern teaching and learning methods. Regional and remote education and training services are increasingly delivered online. • The international education sector is thriving and growing to meet or exceed targets. Through a range of strategic measures implemented by the WA Government, the education and training sector’s share of gross state product has increased materially. • Course offerings and the associated infrastructure are designed for the modern economy, with higher education and student accommodation located both in the Perth central business district (CBD) and across well-connected urban areas.
 <p>Arts, culture, sport and recreation (ACSR)</p>	<ul style="list-style-type: none"> • WA has a wide variety of ACSR facilities, but some existing assets are no longer fit for purpose due to historical under-investment. • WA’s long-term tourism outlook is unclear, and tourism-related activities are not always well coordinated to achieve integrated industry outcomes. • Opportunities for enhanced liveability, creativity and economic activity are lost to WA in some cases, due to a lack of enabling ACSR infrastructure. 	<ul style="list-style-type: none"> • The recognition of WA’s natural beauty, vibrant arts, Aboriginal cultural offerings and strong sporting identity has resulted in a booming tourism trade. • WA’s world-class and contemporary suite of ACSR venues attract events and performances, audiences, athletes and participants from around the world. • Investment in ACSR infrastructure has resulted in a thriving and diverse creative arts industry, high participation rates in sport and recreation and improved liveability.

Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
 <p>Justice and public safety</p>	<ul style="list-style-type: none"> Increasing demand, exacerbated by COVID-19 (for example, border control), has resulted in a significant increase in the size of WA's police force. WA has the second-highest imprisonment rate in Australia per 100,000 adult population, and the highest Aboriginal and Torres Strait Islander imprisonment rate per 100,000 adult Aboriginal and Torres Strait Islander population.⁶ Emergency response training facilities and radio communications are under pressure to keep pace with legislative changes, the impact of climate change, and the demands of urban infill and design. 	<ul style="list-style-type: none"> A focus on early intervention, prevention and rehabilitation has reduced crime rates in WA and resulted in safer communities. Technology interventions have enhanced crime prevention, modernised court proceedings and improved offender rehabilitation. Fire and emergency services responders are resilient and highly skilled, supported by modern communications and trained to deal with a wide range of incidents.

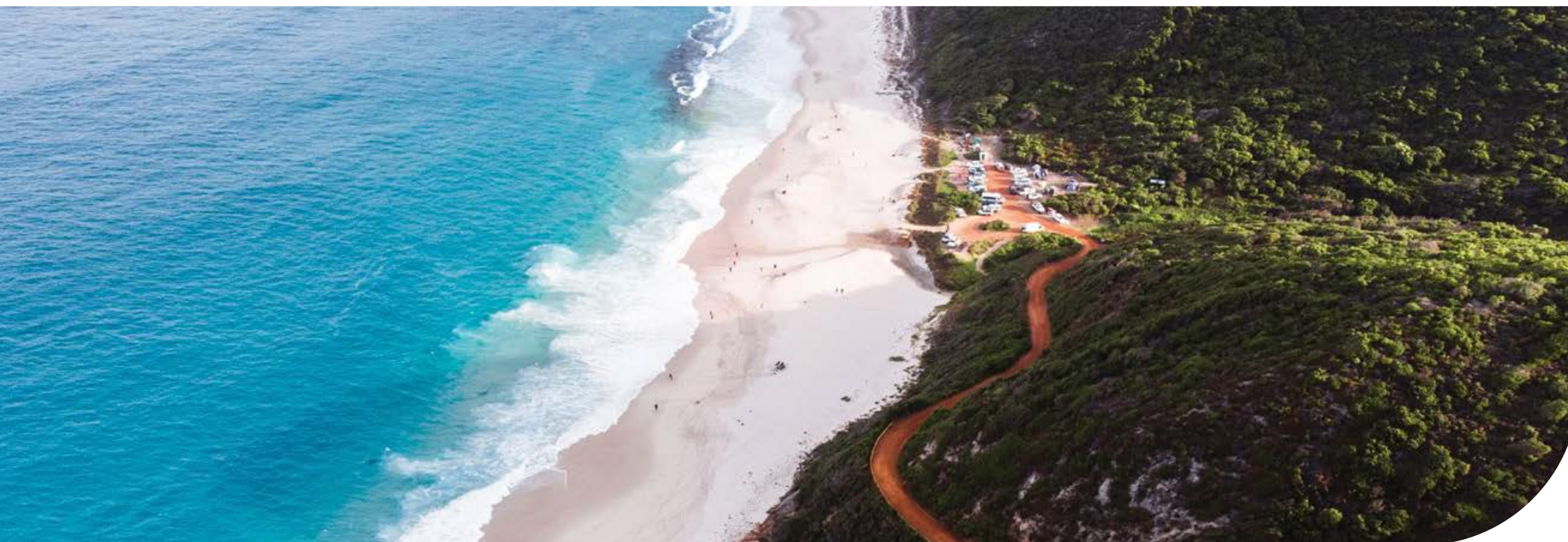





Table 1: Western Australia – today and tomorrow (continued)

	Today – 2022	Tomorrow – 2042
Society, economy and environment		
 <p>Society</p>	<ul style="list-style-type: none"> WA's population is 2.7 million.⁷ Approximately 75% of the state's population live in the Perth metropolitan area, and 25% live in regional WA (inclusive of the Peel region).⁸ WA's population growth is largely driven by immigration in response to economic growth cycles, most recently due largely to the resources sector. The population of Greater Perth increased by 1.8% in 2019–20, the second-highest growth rate of all Australian capital cities.⁹ 	<ul style="list-style-type: none"> WA's population is around 4.3 million, an increase of 60% since 2021.¹⁰ Continuing strong population growth is the main driver for efficient, effective and timely provision of public infrastructure. The population of regional WA has increased. Service models have been planned and adapted to meet the changing needs of communities across WA. WA's population is ageing. There are proportionally fewer children (under 15 years of age) and a larger proportion of people over the age of 65.¹¹ An ageing population has increased demand for health, aged care, disability services, accessible transport and housing services.
 <p>Economy</p>	<ul style="list-style-type: none"> WA's gross state product was \$361.8 billion in 2020–21 or 17.5% of Australia's gross domestic product.¹² WA's economy is more dependent on exports than any other state or territory in Australia. WA's top 5 export markets are China (60%), Japan (9%), South Korea (6%), United Kingdom (4%) and Singapore (4%).¹³ Commodities dominate WA's exports, and WA is currently the world's largest single supplier of iron ore and lithium, and second-largest exporter of LNG and alumina.¹⁴ It is acknowledged that economic diversification is required to drive new sources of innovation and growth and improve resilience of the economy to resources demand. 	<ul style="list-style-type: none"> The resources sector is continuing to contribute strongly to the economy, driven by global demand. However, competition from foreign producers has increased.¹⁵ The resource sector's share of WA gross value add has grown.¹⁶ However, the sector's share of WA employment has decreased due to new technologies. Service industries such as health care and social assistance contribute more to gross value add and employment, outpacing agriculture and construction.¹⁷ Infrastructure has strengthened global competitiveness and the productivity of existing industries and supported the growth of new industries that have capitalised on WA's strengths. Trading partners increasingly value WA's enhanced global position as a safe, clean and green location due to its stable, open economy and strict biosecurity measures.
 <p>Environment</p>	<ul style="list-style-type: none"> WA is internationally renowned for its biodiversity. WA has 8 of Australia's 15 biodiversity hotspots, and 1 of the world's 36.¹⁸ The south-west hotspot, which extends from Shark Bay to Esperance, hosts more than 8,000 plant species, of which about half are found nowhere else.¹⁹ Increasing community expectation for strategic, sustainable developments that protect valuable natural assets, delivered through initiatives such as the Native Vegetation Policy for WA. 	<ul style="list-style-type: none"> The intrinsic value of WA's environmental assets is well recognised. The state balances sustainable development with conservation and enhancement for future generations. There is ongoing focus across state agencies and GTEs to deliver infrastructure that is resilient to and mitigates climate change, and to choose solutions that avoid and mitigate impacts on natural assets.



Introduction

Infrastructure shapes and influences every aspect of our modern world – from where we live, to how we work, our social interactions and economic structures. It enables us to plan and respond to change, and ensures our daily essentials are provided safely and reliably.

Well-planned and efficient infrastructure is essential to enhancing liveability and maintaining a strong economy and healthy environment. Most infrastructure is built to last for several decades and will still be in use at a time when society, the economy and the environment may look vastly different from what they do today. Having a long-term and comprehensive state infrastructure strategy in place is important because it enables the WA Government to consider long-term global trends as well as local challenges. In times of increasing change, having a robust vision and direction that unifies stakeholders and creates clear pathways for change has arguably never been more important.

Infrastructure WA

IWA is a statutory authority tasked with providing expert advice and assistance to the WA Government on the state's infrastructure. IWA was established in July 2019 and is governed by a Board established under the IWA Act. Aside from developing a 20-year strategy, IWA also undertakes a range of other roles, including:

- assessing major infrastructure proposals
- providing advice to the WA Government on the preparation of an annual 10-year state infrastructure program (from 2023)
- providing advice and assistance to state agencies and government trading enterprises (GTEs) in preparing infrastructure strategies, plans, policies and proposals
- coordinating the state's submissions to Infrastructure Australia
- providing advice to the Premier on infrastructure priorities, and the funding and financing of infrastructure
- reviewing and reporting to the Premier on completed infrastructure projects.

Under the IWA Act, IWA is required to assess all major infrastructure proposals (defined in the IWA Act as projects and programs with a capital cost of \$100 million or more, those nominated by the Premier or as defined in regulation) prior to an investment decision being made. Interim guidelines were released in late 2021, setting out the multiple-step assessment process and adopting the Department of Treasury's Strategic Asset Management Framework as the basis for content requirements. IWA liaises with the Department of Treasury and proponent state agencies and GTEs in undertaking this function, including involvement through the earlier stages of concept and business case development. The guidelines will be refined over time in collaboration with state agencies and GTEs, including with regard to alignment with Infrastructure Australia's Assessment Framework, where appropriate, and any relevant recommendations from this Strategy that are supported by the WA Government.

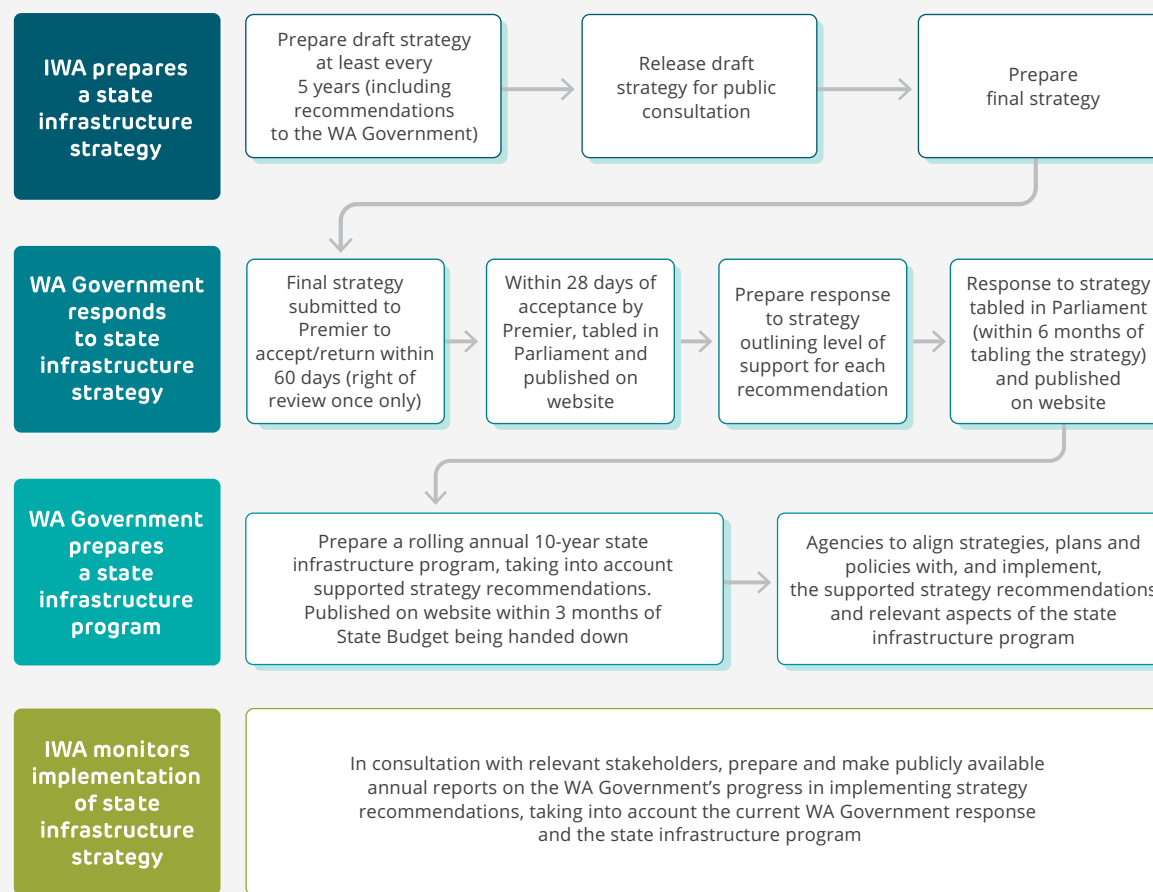
State Infrastructure Strategy

The IWA Act requires IWA to prepare a strategy at least every 5 years. Each strategy must:

- identify WA's significant infrastructure needs and priorities over at least the next 20 years
- identify the social, economic and environmental objectives against which infrastructure needs are assessed
- make recommendations regarding significant projects, programs and/or other options that meet identified needs and priorities, funding and financing options for these projects and programs where appropriate, and indicate the relative priority of recommendations.

Following the WA Government's formal response to the Strategy's recommendations, IWA will work with relevant stakeholders to ensure timely implementation of the recommendations supported by the WA Government. IWA will monitor and report on the WA Government's progress in implementing the Strategy's recommendations on an annual basis. The full process, which includes the interplay with the annual 10-year state infrastructure program, as required by the IWA Act, is set out in Figure 2.

Figure 2: Process overview





This Strategy is comprised of several key elements, headlined by the Strategy's 2042 vision (Figure 3). Further details on the approach to developing the Strategy are outlined in the Methodology chapter.

Figure 3: Key elements of the State Infrastructure Strategy



This Strategy focuses on non-build solutions, such as **policy, regulation, pricing, asset management, technology, procurement** and **governance reforms**, along with **new infrastructure projects and programs**.

Strategy objectives

IWA's objectives for the Strategy indicate the critical areas of focus over the next 20 years. Required under the IWA Act, these objectives have been applied, along with other criteria, to guide the formulation of the recommendations and will continue to guide IWA's monitoring and reporting on implementation of the Strategy. The 10 objectives are expressed below and should be viewed through an infrastructure lens. Consultation on the draft strategy largely supported these objectives.



Support a strong, resilient and diversified economy

WA's infrastructure supports long-term economic growth and facilitates industry diversification to achieve competitive advantage. The economy is more productive, innovative and supported by efficient and reliable supply chains, and a skilled workforce, and better able to withstand and adapt to extreme shock events.



Maximise regional strengths to unlock strategic opportunities for Western Australia

Regional initiatives and industries that build on the strengths of a region (or multiple regions) and support long-term, statewide outcomes are supported by investment in enabling infrastructure. Gaps in social services have been addressed, supporting the wellbeing of regional communities and their ability to attract and retain people.



Support access to social services and improve Aboriginal wellbeing

Social services models plan and adapt to suit the changing needs of communities, with a strong focus on early intervention and prevention. Access to health, education and training, justice and public safety services meets community needs. There are sufficient social and affordable housing options available. Self-determination and capacity-building opportunities have resulted in more empowered Aboriginal communities, with strong growth seen in the capacity and capability of Aboriginal businesses.



Enable environmental sustainability and resilience, and address climate change

Carbon emissions related to WA's infrastructure and their impacts on the environment have been reduced. Infrastructure planning, delivery and operation results in systems that are resilient to the impacts of climate change, improve environmental outcomes, and reduce, reuse and recycle resources.



Maximise wellbeing, liveability and cultural strategic opportunities for our community

Arts, culture and heritage have been supported by investments in well-designed cultural infrastructure that result in inclusion and wellbeing. 'Blue' and 'green' infrastructure supports sports and recreational activities that contribute to a healthy and safe community.



Enhance cross-government coordination and planning

Integrated land-use and infrastructure outcomes have been achieved through strong cross-government collaboration and engagement with industry. Reform initiatives have resulted in strategically aligned, contemporary and fit for purpose planning, policy and regulation.



Support population growth and change

WA's infrastructure meets the changing demands of the population and facilitates population growth in the right places, maximising our existing infrastructure. Alternative service models have been established resulting in efficient and effective infrastructure and services in areas experiencing population decline.



Embrace technology, data and digital connectivity

Western Australians have access to high-quality digital connectivity and enjoy the economic benefits of a strong technology sector. Data and a digital-first approach inform decision-making and optimise infrastructure efficiency. A strong cybersecurity capability protects our information and assets.



Enhance infrastructure delivery and develop skills for the future

Infrastructure planning and delivery is supported by a skilled and agile workforce. Investments are staged to maximise value for money and market capacity to deliver. Delivery of infrastructure benefits from improved procurement and best-practice project management and assurance.



Get the most from our infrastructure and improve maintenance

Best-practice asset management and maintenance has delivered optimal performance and supported investment prioritisation. The value of government assets has been maximised through improved lifecycle planning and delivery of fit for purpose infrastructure. Non-build solutions, such as demand management measures, have been adopted where appropriate.

Infrastructure for resilience

Infrastructure plays a vital role in the resilience of our cities, towns and communities. The community's dependence on infrastructure is thrown into sharp relief in times of crisis or disaster, and infrastructure is increasingly tested by ongoing stresses, ranging from ageing infrastructure through to increasing population and competing investment priorities. Currently in WA, there is no comprehensive statewide approach to resilience that seeks to identify the shocks and stresses relevant to WA's cities, towns, infrastructure and communities. This may impact the ability of planning and infrastructure delivery agencies to adequately assess need and implement actions to increase long-term resilience of assets, systems and communities.

The state's existing and future infrastructure should not only be resilient but also improve and support the resilience of Western Australians. That is, infrastructure should be able to withstand disruption, operate in crisis and deal with and adapt to shocks and stresses, and help the WA community to do the same. Infrastructure has a critical role to play in supporting community resilience. With increasing uncertainty and a changing risk landscape, the way infrastructure is planned, built, maintained and operated will need to change.

Shocks and stresses refer to both the sudden, sharp events that have the potential to disrupt the services supplied by infrastructure, such as natural disasters, cyber threats or a pandemic, and the long-term, chronic conditions that impact our assets, organisations and communities, including the vulnerability of ageing infrastructure and ongoing climate change. Stresses can, and do, exacerbate the impact of shock events.

In infrastructure planning, the understanding that the resilience of an asset is dependent on the environment and community that it services and vice versa is vital. Therefore, the focus should not be on just the resilience of a particular piece of infrastructure, but also on the contribution it makes to the resilience of the overall community. This is known as 'infrastructure for resilience'.

In line with Infrastructure Australia's Assessment Framework, there are 7 characteristics of resilience that should be considered for infrastructure projects and programs:

- **robustness:** the ability to withstand shocks and stresses without significant damage or disruption
- **redundancy:** the ability to maintain operations without significant deterioration in quality or value through additional capacity, flexible systems or substitution
- **resourcefulness:** the ability of operators, users and infrastructure itself to use resources in alternative ways to respond to shocks and manage stresses
- **recovery:** the ability to respond and mitigate the consequences of shocks and stresses
- **adaptability:** the ability to continually assess, build knowledge, learn and improve to inform future decisions
- **integration:** the ability to embed resilience in all decision-making, across systems, sectors, activities and risks
- **inclusivity:** the ability to involve all citizens and stakeholders to reflect the diversity of those using or in proximity to the infrastructure.¹

The Strategy introduces resilience as a concept within the infrastructure lifecycle. It addresses a range of matters that contribute to more resilient infrastructure, including improved data management for better decision-making, cybersecurity and climate change mitigation and adaptation. Embedding resilience throughout infrastructure planning, delivery and operation supports the 10 objectives of the Strategy. As resilience maturity grows within WA, further development and guidance may be needed to embed resilience across and between state agencies and GTEs.

What infrastructure does this Strategy address?

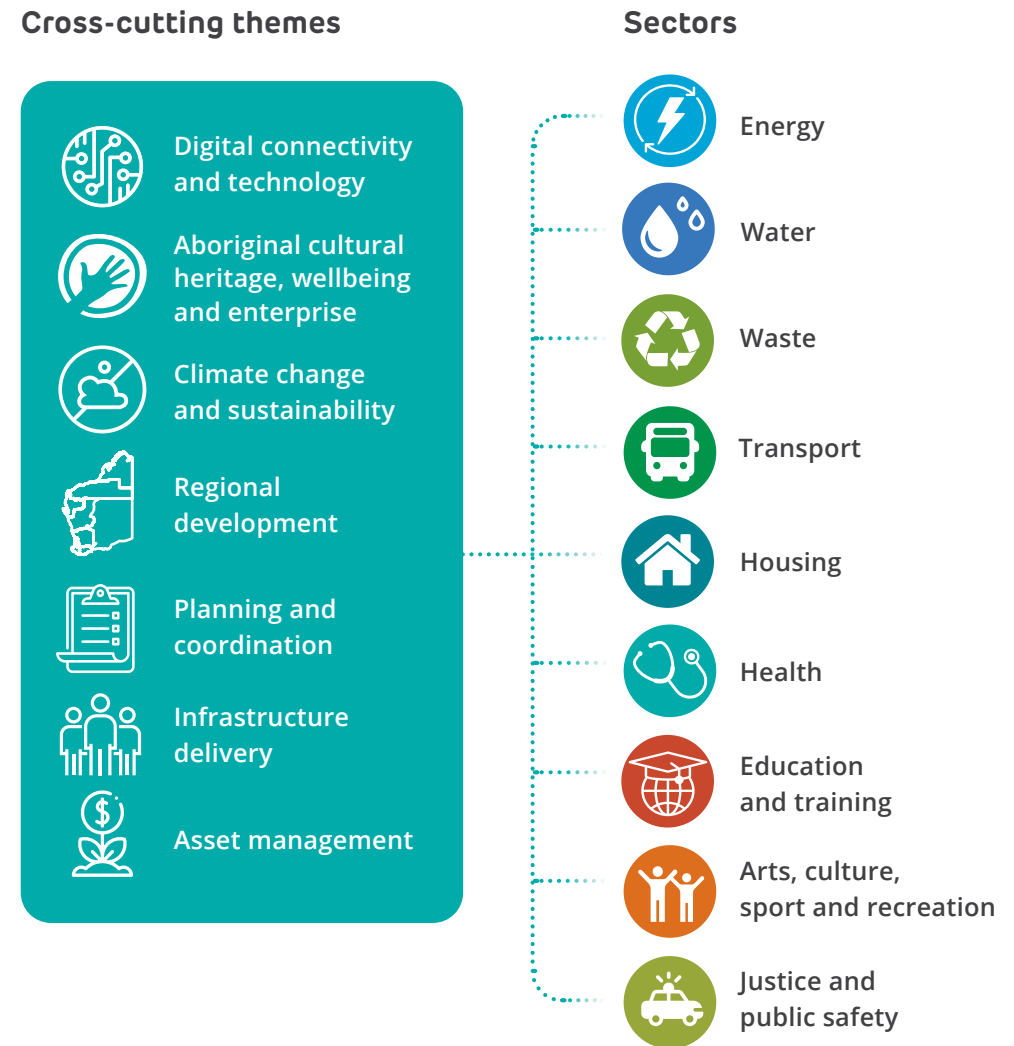
The Strategy addresses key infrastructure pressures and trends facing the state over the next 20 years. To enable a system-wide view, it addresses a broad range of infrastructure types, categorised in this document as 9 sectors (Figure 4). This categorisation allows for the identification of themes and interdependencies common to many sectors. In considering the impact of external drivers on infrastructure sectors, as well as each sector's relationship to others, 7 cross-cutting themes emerge that influence WA's infrastructure agenda and underpin the Strategy (outlined further in their individual chapters) (Figure 4).

Infrastructure has both tangible and intangible elements that can be broadly categorised into build and non-build considerations. The Strategy focuses on non-build solutions, such as policy, regulation, pricing, asset management, technology, procurement and governance reforms, along with new infrastructure projects and programs.

Infrastructure is planned, delivered and managed by all levels of government, private industry and the community. The Strategy encompasses infrastructure owned and delivered by state agencies and GTEs. Infrastructure owned and operated by the private sector has also been considered in some cases, particularly infrastructure that has a direct or indirect financial or government policy implication.

In considering infrastructure for the Strategy, IWA has applied a significance test, rather than setting a dollar threshold. This significance test takes into account the impact and transformational aspect of infrastructure to a region and the state, along with alignment to the Strategy's vision for 2042, the 6 strategic opportunity areas and 10 objectives. The dollar threshold that triggers IWA's assessment of major infrastructure proposals (a capital cost of \$100 million or greater) does not apply to the Strategy.

Figure 4: Infrastructure cross-cutting themes and sectors

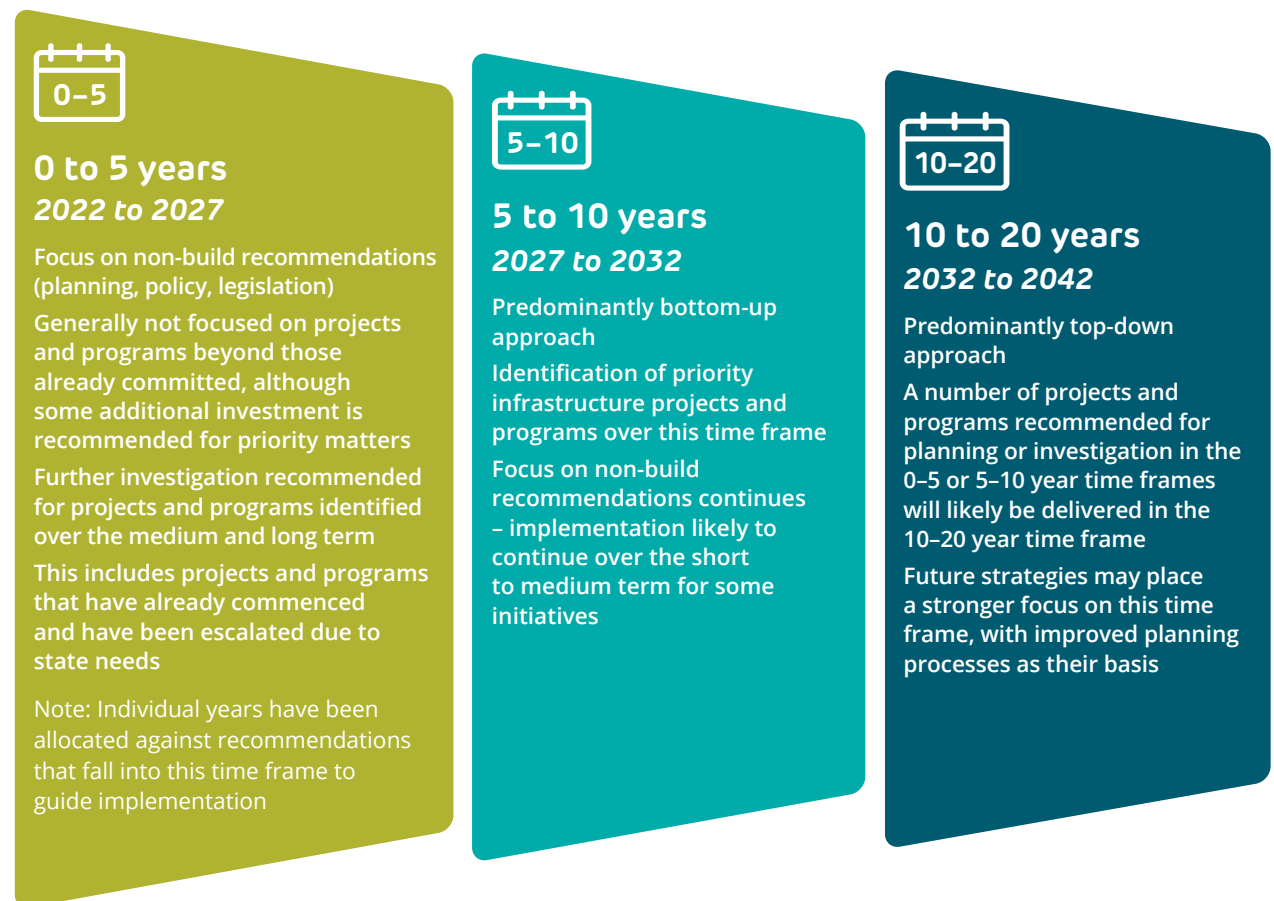




Strategy time frames

The Strategy's 20-year time frame has been divided into 0–5, 5–10 and 10–20 year time frames (Figure 5). As this Strategy is strongly focused on addressing key requirements that frame and guide infrastructure processes (for example, strategic planning, legislation and regulation, policy and decision-making tools), it is largely focused on initiatives over the 0–5 and 5–10 year time frames.

Figure 5: State Infrastructure Strategy time frames



Recommendations within the Strategy's 0-5 year time frame are essential to establishing longer-term plans across all state agencies and GTEs. Through the consultation process, IWA received feedback from stakeholders requesting greater guidance on specific dates for completing implementation of recommendations within the 0-5 year time frame as planning and delivery for critical infrastructure needs to proceed in a timely manner. IWA has undertaken a review of these recommendations and identified specific years for completion to ensure the overall timing of the recommendations as a package is affordable and achievable.

As highlighted in the Strategy's name, *Foundations for a stronger tomorrow*, the document concentrates mostly on the next 10 years to ensure government is getting the basics right and building the foundations to assist with the development of future state infrastructure strategies. As infrastructure processes mature and there is improvement in the quality of relevant infrastructure plans that inform the bottom-up approach, it is likely that future state infrastructure strategies will place a stronger focus on the 5-20-year time frame.

Implementation completion time frames and the suggested lead state agency or GTE for each recommendation are outlined in the Summary of Strategy recommendations at the end of this document. IWA will assist the WA Government throughout implementation of supported recommendations. Through its annual monitoring and reporting role, IWA will report

on the WA Government's progress towards implementing each recommendation according to the relevant completion time frame.

Moving forward, the Strategy provides the framework that will enable the public sector to develop its infrastructure plans and programs in a more coordinated and comprehensive manner.

Relationship with other strategies

Consistent with the requirements of the IWA Act, relevant government strategies, plans, policies, priorities and forecasts have been considered by IWA in developing the Strategy. For example, IWA has considered the economic development framework within Diversify WA and strategic land-use frameworks such as Perth and Peel @ 3.5 million, and regional planning and infrastructure strategies. Sector-specific strategies and plans have also informed the Strategy's content and recommendations. This includes, but is not limited to, the Energy Transformation Strategy and the *Western Australian Renewable Hydrogen Strategy* in the energy sector, the *Sustainable Health Review: final report to the Western Australian Government* in the health sector, *Perth and Peel@3.5million: the transport network* and the *Revitalising Agricultural Region Freight Strategy* in the transport sector, and the Waste Avoidance and Resource Recovery Strategy 2030. Whole of government and cross-sectoral plans were also reviewed, including, but not limited to, the WA Climate Policy and the Strategic Asset Management Framework.

Relationship with federal and local governments

IWA has considered the roles of all 3 levels of government in the preparation and implementation of the Strategy.

Infrastructure Australia and the Australian Government

IWA has specific legislated functions in relation to Infrastructure Australia. IWA coordinates the WA Government's submissions to Infrastructure Australia in close collaboration with relevant state agencies and GTEs. Infrastructure Australia, the Australian Government's independent advisory body, is IWA's primary interface between federal and state government agencies. The state receives funding contributions from the Australian Government, particularly for infrastructure and services relating to the transport, health and education sectors.

Through 5-yearly infrastructure audits, Infrastructure Australia identifies the major challenges and opportunities facing Australia's infrastructure over the following 15 years.² The audit is conducted and developed in consultation with states and territories. In future audits, IWA will be responsible for coordinating the WA Government's engagement on the audit. The challenges and opportunities identified in the most recent audit were considered as part of IWA's bottom-up approach in developing the Strategy.³ Following each audit, Infrastructure Australia prepares a 15-year infrastructure plan, which outlines national roadmaps for reform.

Reforms to meet Australia's future infrastructure needs: 2021 Australian Infrastructure Plan provides recommendations on priority infrastructure reforms across the nation for implementation at both a federal and state level. Infrastructure Australia and IWA engaged throughout the parallel development of the plan and this Strategy.⁴ It is expected that future plans and strategies will inform one another.

Infrastructure Australia also prepares an annual Infrastructure Priority List, which outlines the national infrastructure needs for consideration by federal and state governments.⁵

IWA coordinates the WA Government's submissions to this annual process and the business cases for initiatives that are listed.

Infrastructure Australia and IWA maintain a close and collaborative working relationship. This will continue to develop as IWA moves into its wider functions, such as Major Infrastructure Proposal Assessment, supporting state agencies and GTEs in the development of submissions and coordinating other activities, such as training and policy advice, with Infrastructure Australia.

Local governments

There are many linkages and interdependencies between infrastructure, the Strategy and local government planning, policy and service delivery. The operations and responsibilities of local governments intersect with all the themes identified in the Strategy.

Local governments have a significant role in:

- the planning and provision of infrastructure as an important decision-maker, regulator and participant
- the provision of services
- the direct and closest government link to the community in many cases.

The community has a strong expectation that local character and needs will be an important factor when determining local infrastructure priorities. Challenges that local governments face include meeting the diverse needs of the community with finite financial resources. This includes the development of new infrastructure and operating and maintenance costs of existing infrastructure. This is especially the case for remote local governments with a small rates base who are often unable to self-fund infrastructure projects and are reliant on federal and state government grants for major infrastructure delivery.

Some local governments seek to take a community development approach to building civic infrastructure around their public institutions and focus on how anchor institutions, such as public libraries, civic offices and shopfronts, are connected to social infrastructure and social services.

There are 139 local governments in WA, including 2 Indian Ocean territories.⁶ Integrated planning and reporting gives local governments a framework for establishing local priorities and linking this information to operational functions. The *Local Government (Administration)*

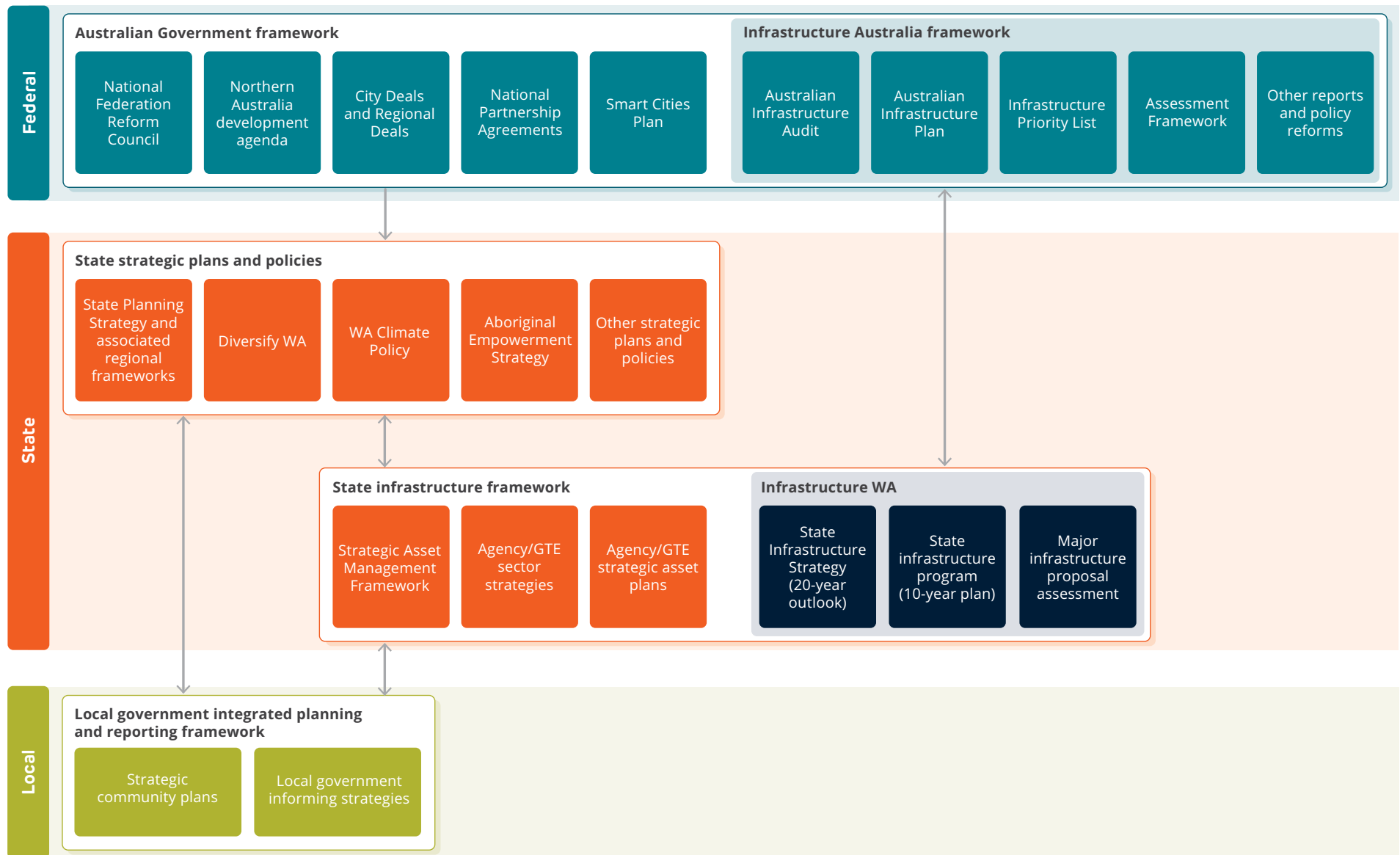
Regulations 1996 requires each local government to adopt a strategic community plan and a corporate business plan.

Associated plans and strategies (particularly financial, asset management and workforce) inform a local government about how capable it is of delivering the services and assets required by the community. Issue-specific informing plans and strategies, such as community safety and disability support strategies or major infrastructure or works strategies, also assist the local government to deliver the services, assets and projects required by the community. Other informing plans and strategies include asset management plans, long-term financial plans, local health plans, local waste plans, local planning strategies and economic development strategies.

Local government plans and strategies set out the medium-term and long-term plans for each local government and focus on the upgrade, renewal and development of infrastructure required to deliver services to the community. It is acknowledged that several of the Strategy's recommendations will have an impact on local governments and will intersect with their responsibilities. Local governments and the community will remain key stakeholders that should continue to be engaged where necessary during the implementation of the Strategy.

Figure 6 demonstrates how the 3 levels of government align in the provision of infrastructure, and how the local government integrated planning and reporting framework can inform state and regional strategic plans and policies and vice versa.

Figure 6: Government integration



Note: The plans, policies and frameworks referenced in this diagram are key examples and do not represent a comprehensive list.

Impact of COVID-19

Worldwide, the impacts of the COVID-19 pandemic have been and continue to be profound. In addition to the health impacts, measures to reduce the spread of the virus, such as lockdowns and travel restrictions, are significantly impacting economic activity and changing fundamental norms.

It is inevitable that COVID-19 will be an ongoing part of life for the foreseeable future. Achieving a high vaccination coverage means fewer people will become very sick, need hospital care or die from COVID-19. Depending on the nature of any outbreak, relevant public health and social measures may need to be temporarily scaled up, in a targeted way if necessary, to slow the spread of COVID-19 and reduce the impact.

While it is still too early to understand with any certainty the long-lasting effects and the implications for infrastructure, developing this Strategy in the context of COVID-19 is an opportunity to capitalise on positive impacts and ensure infrastructure investment can contribute to long-term recovery and resilience. The WA Recovery Plan is driving, and will continue to drive, economic and social recovery across the state in sectors such as construction, manufacturing, tourism and hospitality, renewable energy, education and training, agriculture, mining and conservation.

Skills shortages and staff absenteeism have emerged as a pressing issue across a range of industries, exacerbated by the restricted availability of labour from interstate and overseas. There are reports of skills shortages in industries that are central to the state's economic recovery, including mining, construction and transport, as well as in the health and hospitality sectors.⁷ The resources industry, however, has been able to continue operations and provided significant economic stability for both WA and the nation. Nevertheless, some industries have experienced decline. Agriculture and fishing industries suffered from the lack of seasonal labour, while education and training are impacted as closed borders exclude international students.⁸ The tourism, arts and recreation industries have also experienced negative impacts.⁹

The COVID-19 pandemic has highlighted the strategic importance of reliable, safe and efficient supply chains and the associated supporting infrastructure. There has been an increase in freight driven by online shopping, but a decrease in domestic and international aviation due to border closures and travel restrictions.¹⁰

COVID-19 has also affected passenger transport use, as more people worked remotely during lockdowns and have continued to do so since. There has been a reduction in public transport use and an increase in transport via private car, personal mobility device and active transport.¹¹ The Productivity Commission's *Working from home* research paper (September 2021) found the percentage of Australians working remotely had jumped from 8% to about 40% over the past 2 years.¹² Census data from 2016 shows that approximately 35% of workers had jobs that could be done remotely.¹³ The ability to work remotely is associated with higher levels of education, higher incomes and full-time employment.¹⁴ Companies will need to take proactive measures to help workers acquire and share new information across groups, so that productivity, collaboration and innovation are not impacted with the increase in remote work. Technology is likely to continue to significantly or completely change the way people work over the time frame of the Strategy.

The health sector responded quickly to COVID-19. Testing and treatment facilities were expanded. There was a rapid escalation in telehealth and telephone appointments, which saw an increase of 66% from May 2021 compared to October 2019.¹⁵ Between July 2020 and April 2021, mental health-related emergency department attendances increased by 4% compared to the same period in 2019–20.¹⁶ The mental health impacts of the pandemic continue to be an important issue, particularly for young people, and are expected to have further implications into the future.

The WA Government committed an additional \$1.3 billion in spending on health and mental health in the 2021–22 mid-year review. This comprises additional beds and staff to meet demand and increase capacity for when COVID-19 enters the WA community, additional pandemic response spending such as vaccinations and testing, and other initiatives including health information and communications technology and infrastructure. This increases the total additional investment in health spending (including the 2021–22 State Budget) to \$3.2 billion.¹⁸

Other social services, including education, were also impacted. There was a shift to online learning and a major decline in international education. The use of public parks and urban greenspace also increased. Housing availability remained an ongoing concern, with rental vacancy around 1% for Perth, and increasing waiting lists for public housing.¹⁹

Restricted mobility and physical distancing rapidly increased our use of digital platforms to do business as well as to connect socially, highlighting the importance of connectivity. The Strategy seeks to leverage this momentum, supporting digital transformation across all sectors, and improved connectivity, particularly to remote and disadvantaged communities, to ensure equitable access to social services and commercial opportunity.²⁰

COVID-19 has had significant implications for infrastructure across many sectors, both in terms of current usage and long-term planning. With border closures impacting immigration in the short to medium term, it is important that infrastructure investment supports economic growth and diversification. The Strategy takes a longer-term perspective to complement shorter-term recovery investment, and focuses on initiatives, projects and programs that will deliver social, economic and environmental benefit to support long-term resilience.



Developing this Strategy in the context of COVID-19 is an opportunity to capitalise on positive impacts and **ensure infrastructure investment can contribute to long-term recovery and resilience.**

Methodology

The development of IWA's first Strategy involved engagement with a wide range of stakeholders, and extensive analysis of material to help inform an objective position of the state's infrastructure needs and priorities. To develop a long-term outlook for the Strategy, it was necessary to review the current status of infrastructure planning and delivery in WA, as well as form a view on what the future needs and priorities of the state are likely to be.

Infrastructure WA's guiding principles for the Strategy

- Open, consultative and engaging
- Objective and rigorous
- Improvement over time
- Affordable, deliverable and maximise value
- Forward looking and open to change

The IWA Act, Strategy vision, objectives and guiding principles steered development of this first Strategy. IWA has placed a strong focus on:

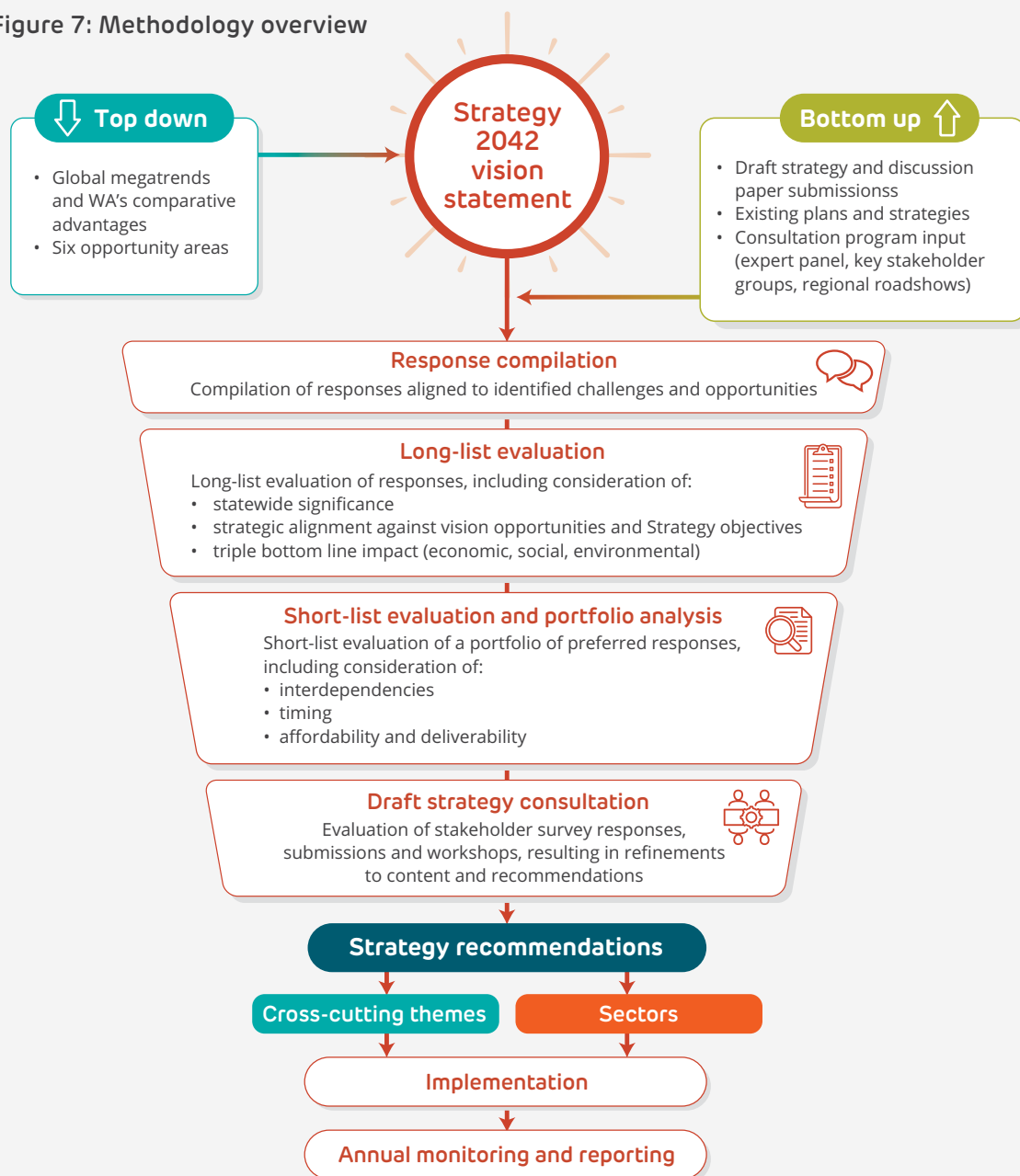
- using existing infrastructure more effectively, including through prevention and demand management approaches
- addressing the complete infrastructure lifecycle

- developing a strong understanding of the needs of each region, particularly the non-metropolitan regions
- supporting Aboriginal cultural heritage, wellbeing and enterprise
- applying a triple bottom line (social, economic and environmental) approach
- understanding the baseline of existing infrastructure networks and processes
- considering the affordability and deliverability of the recommendations, particularly in the context of the current COVID-19 pandemic.

As outlined in *A stronger tomorrow: State Infrastructure Strategy discussion paper*, IWA applied a hybrid top-down/bottom-up approach in developing the Strategy.¹ This was informed by a bottom-up assessment of the short-term to medium-term outlook over the next 10 years, and a strategic top-down assessment focusing on the long-term outlook out to 20 years. An overview of the methodology is shown in Figure 7.



Figure 7: Methodology overview



IWA applied a hybrid **top-down/bottom-up** approach in developing the Strategy.

Top-down approach

To identify appropriate strategic infrastructure responses, it was critical to understand the long-term strategic vision for WA. This required an assessment of the global context in which WA sits, and potential changes to this environment over the next 20 years. IWA applied a scenario-planning approach to identify global megatrends and developed a range of plausible futures to identify how WA can best respond to a changing world. Six opportunity areas were identified (representing where global megatrends and the state's comparative strengths intersect), which underpin the Strategy's vision (see Appendix A for further detail on IWA's scenario-planning outcomes).

This approach has ensured the Strategy has a broader and longer-term focus than planning horizons usually applied by government. Ongoing monitoring of the environment will be needed to guide strategic infrastructure decision-making into the future.



Bottom-up approach

A key part of developing this Strategy involved the review and analysis of existing infrastructure-related strategies and plans. Applying a standardised methodology, this review focused on establishing the status of WA's existing public infrastructure base and the relevant legislative and policy settings. A further analysis was conducted to establish the levels of planning maturity across the public sector, evidenced by the quality and completeness of the infrastructure strategies and plans of state agencies and government trading enterprises (GTEs).

Other material was considered to gain benefit from wider viewpoints and alternative approaches relevant to each cross-cutting theme and infrastructure sector, including Infrastructure Australia's *An assessment of Australia's future infrastructure needs: the Australian Infrastructure Audit 2019*, other relevant federal strategies and plans, industry research, stakeholder input and other jurisdictional strategies and publications.

Feedback gathered from stakeholders during consultation on *A stronger tomorrow: State Infrastructure Strategy discussion paper* and the supplementary resources *A look at the sectors* and *A look at the regions* also fed into the bottom-up approach.

Evaluation approach

In line with its guiding principles for the Strategy, IWA applied an objective and rigorous approach to analysis, including development of an evaluation framework to assist in examining and prioritising recommendations. Bottom-up and top-down components were combined to identify infrastructure challenges and opportunities, and a long list of potential responses (both build and non-build) for each cross-cutting theme and sector.

A high-level assessment was undertaken to support the consistent, strategic assessment of responses, considering matters such as:

- alignment with the Strategy's 10 objectives and 6 strategic opportunity areas
- triple bottom line impacts (social, economic and environmental)
- affordability and deliverability
- significance of infrastructure responses.

This approach was compared to that used by interstate counterpart infrastructure bodies in the development of equivalent state infrastructure strategies. The criteria applied were consistent with the principles of Infrastructure Australia's Assessment Framework and the Department of Treasury's Strategic Asset Management Framework.

Short-listed responses were assessed in greater detail to determine and refine recommendations. A portfolio analysis considered interdependencies and delivery time frames.

Place-based approach

To tailor infrastructure responses to local needs and opportunities, IWA applied place-based elements to the methodology. The Strategy considered infrastructure issues and opportunities in each of the state's regional areas, as defined by the *Regional Development Commissions Act 1993*, as well as the Perth metropolitan area (Figure 8).

The regions generally encompass 'functional economic areas', each with diverse characteristics and strengths. However, they are also highly interdependent, as parts of seamless cross-regional networks with strong connectivity.

Perth is WA's capital city and the main population, economic and transport hub. All regional areas rely on Perth to some extent to provide the highest level and range of economic and population services, and Perth relies on the regions for much of the state's economic output.

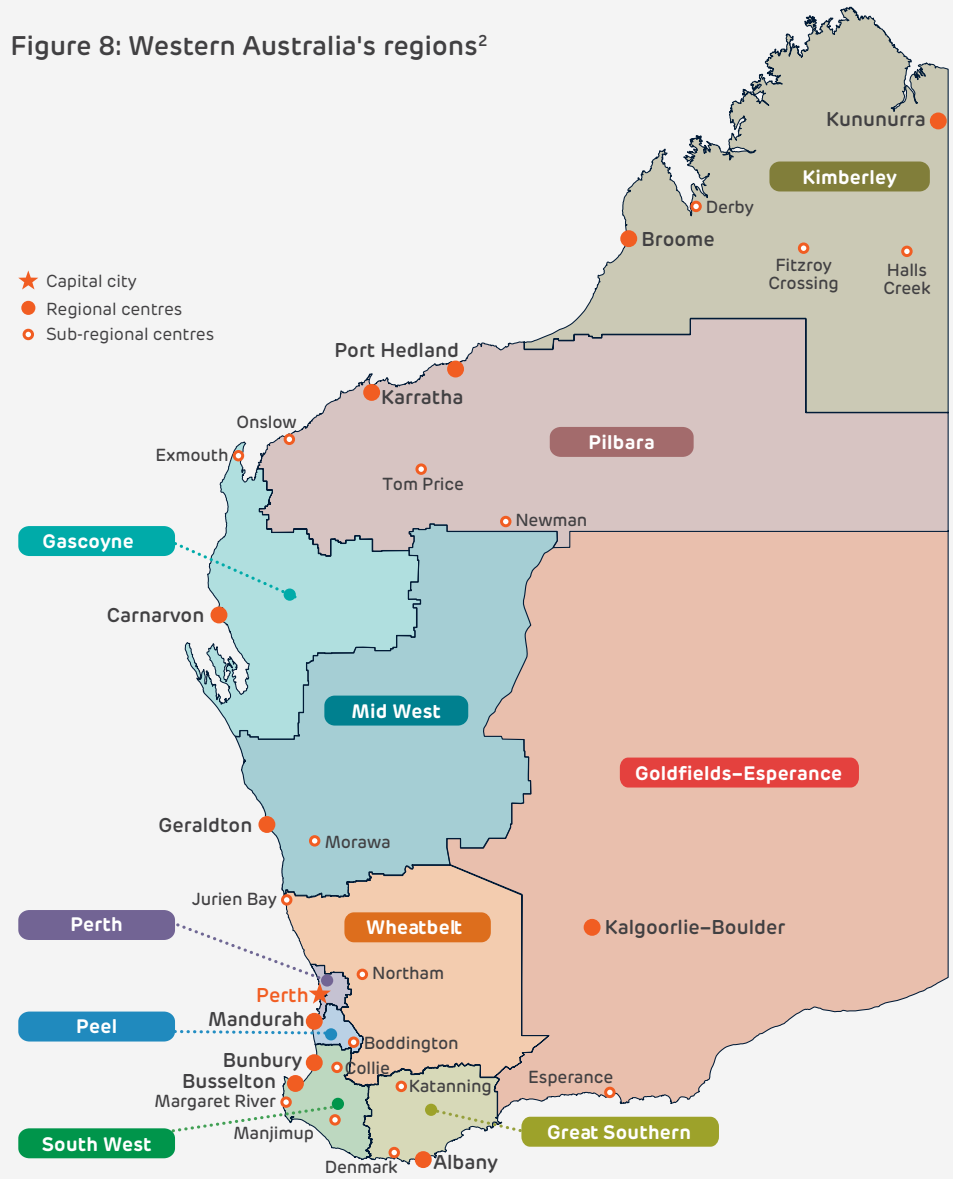
Successful ongoing regional development in WA is a complex challenge, and infrastructure alone certainly cannot deliver the total solution. IWA reviewed a range of regional strategic documents and plans and consulted with regional communities. Cross-regional data analysis was undertaken to better understand how each region was placed to leverage megatrends and maximise strategic opportunities. The Strategy is focused on significant infrastructure proposals (build and non-build) that can capitalise on the relative strengths of each region.

Northern WA is a key regional grouping, comprising the Kimberley, Pilbara and Gascoyne regions. It is aligned to the Australian Government's Northern Australia agenda and is a focus area within Infrastructure Australia's *Reforms to meet Australia's future infrastructure needs: 2021 Australian Infrastructure Plan*.

Regional centres are the main cities or towns of a region that provide higher levels of services and facilities to a network of surrounding smaller sub-regional centres. Remote settlements are small population centres such as remote roadhouses, Aboriginal communities, workers' camps and tourist camps that are geographically distant from larger regional and sub-regional centres. This Strategy includes a focus on remote Aboriginal communities as they support Aboriginal people to live on country and maintain their culture and traditions. The Strategy also addresses the infrastructure needs of town-based reserves to enable appropriate service standards and improved environmental health outcomes.

Precincts are geographic areas that support clusters of related activities, such as urban, train station, education, innovation and industrial precincts. This Strategy includes a focus on precincts, as they capitalise on locational advantages and agglomeration, and can concentrate investment in infrastructure to generate significant benefits.

Figure 8: Western Australia's regions²



Note: Settlement hierarchy as identified in the State planning strategy 2050

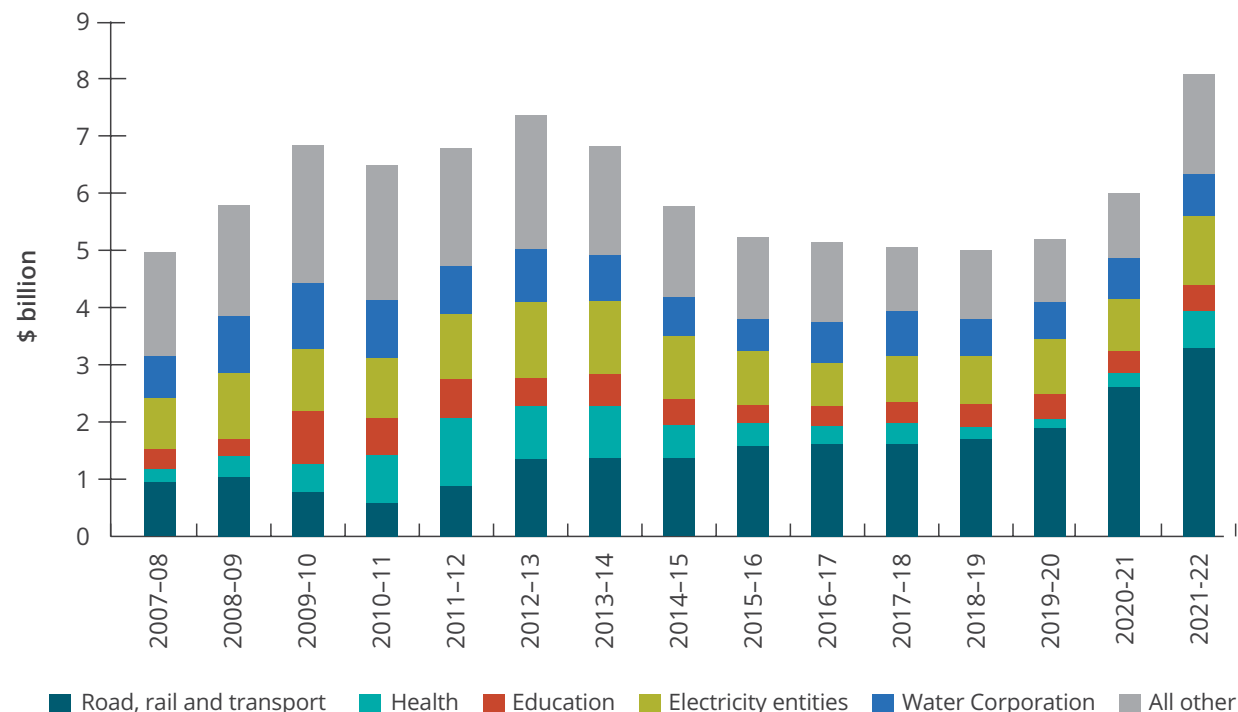
Affordability and deliverability

A key consideration in the amount of public infrastructure that can be delivered is the fiscal capacity of government. IWA is required by the IWA Act to consider the affordability of the Strategy's recommendations, including by reference to the Financial Strategy Statement under the *Government Financial Responsibility Act 2000*. The Financial Strategy Statement in the 2021–22 State Budget lists several targets for the government. The most relevant asset-focused target related to this Strategy is to maintain or increase the net worth (net assets) of the total public sector, which the Strategy is consistent with.

In a broader sense, IWA has carefully considered the affordability and deliverability of the recommendations in the Strategy. Measuring budget capacity for infrastructure delivery over a 20-year time frame is difficult. This is due to uncertainty regarding future economic conditions, the state's volatile revenue base and the limited availability of cost estimates for many proposals.

For over a decade, the state government Asset Investment Program (AIP) has averaged approximately \$6 billion per annum (Figure 9). Over the next 20 years, the value of public investment may grow in line with WA's population and revenue base, while also being subject to cyclical macro-economic conditions. With the current focus on the state's continued recovery from the COVID-19 pandemic, a 4-year AIP of \$32.7 billion is forecast over the current forward

Figure 9: WA Government Asset Investment Program total actual spend 2007–08 to 2019–20, estimated actual spend 2020–21 and budget estimate 2021–22³



estimates period.⁴ In combination with other unique current pressures on the public sector, this increase presents some short-term challenges for capacity and deliverability.

Total public sector net debt is expected to fall for a third consecutive year to \$32.6 billion in 2021–22 and remain relatively stable at \$36.8 billion by 30 June 2025.⁵ Growth in WA's public sector net debt levels remains much flatter than the other states. This reflects the impact of sustained operating surplus forecasts in WA. These surpluses represent an important source of non-debt funding for infrastructure.

Public infrastructure investment is allocated across many sectors. This is reflected in the diversity of Strategy recommendations (Figure 10). A significant ongoing portion of the AIP is dedicated to essential, non-discretionary investment to operate and maintain critical existing infrastructure networks. There is a large, stable level of investment in the electricity, water, roads and education sectors.

Health expenditure can vary based on delivery timing of major new hospital projects, while overall transport investment is currently high. Many recommendations in the Strategy are focused on ensuring value-for-money outcomes across the overall AIP in future years.

The AIP represents the WA Government’s full investment commitments for the 4-year State Budget forward estimates, leaving minimal funding capacity for additional short-term infrastructure investments. Almost all the recommendations in the Strategy over the 2022 to 2027 time frame (0-5 years) are focused on non-build actions (Figure 11). These include many areas of infrastructure planning to inform subsequent potential investments. Some non-build recommendations may have associated costs. In many instances, state agencies and GTEs may be able to address these as part of their core activities, from within existing budget allocations. State agencies and GTEs will have 5 years to complete recommendations in the 2022 to 2027 time frame from when the government responds to the final Strategy, which is anticipated around mid to late 2022. Beyond this time frame, some greater flexibility and capacity is available to the WA Government to determine new infrastructure priorities.

Where IWA has recommended a build response, further planning and business case development is generally required to justify the investment and delivery case for each project or program. For other longer-term potential projects or programs, IWA has generally only recommended that planning or further feasibility investigations occur, with genuine options analysis being a critical component. This will help improve the quality of the state’s investment prioritisation process with better cost estimates and support the development of a more reliable capital investment pipeline. Eventual project and program investment decisions will also need to consider evolving government priorities, the total AIP, and private and public sector delivery capacity.

Given these considerations, IWA is confident that the recommendations of the Strategy over the 20-year time frame are affordable and deliverable.

Figure 10: Recommendations by cross-cutting theme and sector
(including sub-recommendations)

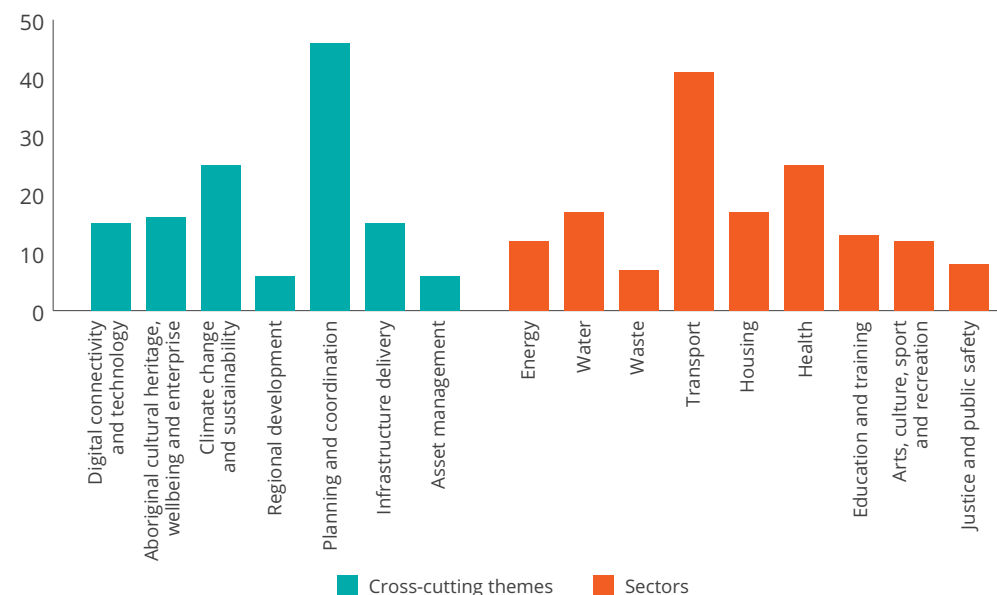


Figure 11: Recommendations by time frame for completion and type
(including sub-recommendations)

